

## IC SHEET DEVICE AND READER/WRITER USING THE SAME

Patent Number: JP2001148000

Publication date: 2001-05-29

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Requested Patent: JP2001148000

Application Number: JP19990331630 19991122

Priority Number(s):

IPC Classification: G06K19/077; B42D15/10; G06K17/00; G06K19/07; G06K19/00

EC Classification:

Equivalents:

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### Abstract

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**PROBLEM TO BE SOLVED:** To provide an IC sheet device, with which an IC chip is easily aligned with a reader/writer.

**SOLUTION:** Concerning the IC sheet device with an IC chip 2 of a non-contact information medium, with which information is written in a memory and information is read out of the memory by radio communication with a reader/writer 3, embedded in a sheet 10 of paper, cloth or plastics the IC chip 2 is easily aligned with the reader/writer 3 by embedding the IC chip 2 in the corner of the sheet 10.

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# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-148000  
 (43)Date of publication of application : 29.05.2001

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(51)Int.CI. G06K 19/077  
 B42D 15/10  
 G06K 17/00  
 G06K 19/07  
 G06K 19/00

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(21)Application number : 11-331630 (71)Applicant : HITACHI MAXELL LTD  
 (22)Date of filing : 22.11.1999 (72)Inventor : TAKASUGI KAZUO

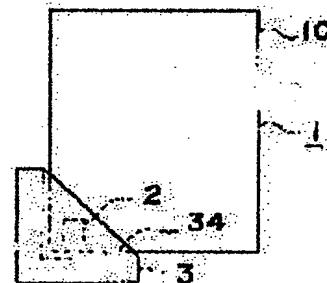
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## (54) IC SHEET DEVICE AND READER/WRITER USING THE SAME

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an IC sheet device, with which an IC chip is easily aligned with a reader/writer.

**SOLUTION:** Concerning the IC sheet device with an IC chip 2 of a non-contact information medium, with which information is written in a memory and information is read out of the memory by radio communication with a reader/writer 3, embedded in a sheet 10 of paper, cloth or plastics the IC chip 2 is easily aligned with the reader/writer 3 by embedding the IC chip 2 in the corner of the sheet 10.




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## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

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CLAIMS

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## [Claim(s)]

[Claim 1] IC sheet equipment characterized by embedding the aforementioned IC chip at the predetermined corner of a sheet in IC sheet equipment which embedded on the sheet IC chip for which writing of the information on memory and read-out of the information from memory are performed by radio with a reader writer.

[Claim 2] IC sheet equipment characterized by making the antenna-coil configuration of the aforementioned IC chip into a form [ \*\*\*\* / the base material of IC chip ] in IC sheet equipment according to claim 1.

[Claim 3] IC sheet equipment characterized by embedding two or more IC chips at two or more corners of the aforementioned sheet, respectively in IC sheet equipment according to claim 1.

[Claim 4] IC sheet equipment characterized by filing two or more sheets which embedded the aforementioned IC chip in IC sheet equipment according to claim 1.

[Claim 5] The reader writer characterized by preparing the slot to which it shows the corner of IC sheet equipment of the claim 1 aforementioned publication in the reader writer which reads information from IC chip which is a non-contact information media, or writes information in IC chip.

[Claim 6] The reader writer characterized by preparing the height to which it shows the corner of IC sheet equipment of the claim 1 aforementioned publication in the reader writer which reads information from IC chip which is a non-contact information media, or writes information in IC chip.

[Claim 7] The reader writer characterized by preparing the clip-like section which puts the corner of IC sheet equipment of the claim 1 aforementioned publication in the reader writer which reads information from IC chip which is a non-contact information media, or writes information in IC chip.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the reader writer using IC sheet equipment and it which embedded on the sheet thin IC chip for which writing of the information on memory and read-out of the information from memory are performed by radio with a reader writer.

[0002]

[Description of the Prior Art] At the IC card which is a typical non-contact information media, by radio with a reader writer, the information from the informational writing and informational memory to memory is read, and, recently, progress of this noncontact IC card is extending a use remarkably.

[0003]

[Problem(s) to be Solved by the Invention] It is very easy to embed IC chip of a non-contact information media into sheets, such as paper, cloth, and plastics, for the purpose of forged prevention, such as an authorization document, in view of the present paper manufacture technology.

[0004] However, there is a problem that it is difficult for a sheet to carry out alignment of eye a flexible hatchet and the IC chip of a sheet to the position of a reader writer simply correctly, the top where it is unclear where [ in a sheet ] IC chip was embedded, and, for this reason, IC sheet equipment was not taken up as one of the applicable fields of a non-contact information media.

[0005] The purpose of this invention is to offer IC sheet equipment which made easy alignment of IC chip to a reader writer, and its reader writer.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the 1st means is characterized by embedding IC chip at the predetermined corner of a sheet in IC sheet equipment which embedded IC chip which is the non-contact information media to which writing of the information on memory and read-out of the information from memory are performed by radio with a reader writer in sheets, such as paper, cloth, and plastics.

[0007] Moreover, the 2nd means is characterized by making the antenna-coil configuration of IC chip into a form [ \*\*\*\* / the base material of IC chip ] in IC sheet equipment of the 1st means of the above.

[0008] Moreover, the 3rd means is characterized by embedding two or more IC chips at two or more corners of a sheet, respectively in IC sheet equipment of the 1st means of the above.

[0009] Moreover, the 4th means is characterized by having filed two or more sheets which embedded IC chip, and making it the shape of books in IC sheet equipment of the 1st means of the above.

[0010] Moreover, the 5th means is characterized by preparing the slot to which it shows the corner of IC sheet equipment of the 1st means of the above in the reader writer which reads information from IC chip which is a non-contact information media, or writes information in IC chip.

[0011] Moreover, the 6th means is characterized by preparing the height to which it shows the corner of IC sheet equipment of the 1st means of the above in the reader writer which reads information from IC chip which is a non-contact information media, or writes information in IC chip.

[0012] Moreover, the 7th means is characterized by preparing the clip-like section which puts the corner

of IC sheet equipment of the 1st means of the above in the reader writer which reads information from IC chip which is a non-contact information media, or writes information in IC chip.

[0013]

[Embodiments of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing. Drawing 1 is the plan showing IC sheet equipment concerning the gestalt of operation of this invention, and a reader writer. In this drawing, the sheet 10 of the square of flexible paper etc. is an authorization document like negotiable securities etc., and the IC chip 2 is embedded at the predetermined corner (in the case of this operation gestalt, it sees from the table of a sheet 10 and is a lower left corner), and it constitutes IC sheet equipment 1. The corner of IC sheet equipment 1 with which the IC chip 2 was embedded is inserted in the reader writer 3.

[0014] The thickness of the IC chip 2 is an about about 50-150-micrometer ultra-thin thing, and the embedding to the sheet 10 with a thickness of about 0.2-0.3mm is possible for it. As mentioned above, an authorization document etc. is for forged prevention, and that the IC chip 2 is embedded can distinguish no longer the purpose which embeds this IC chip 2 on a sheet 10 from appearance. The various information (for example, peculiar identification information given to the sheet 10 concerned, history information on a sheet 10, etc.) about the sheet 10 concerned is memorized by the IC chip 2.

[0015] At the time of textile fabrics or a sheet plastic (film), a sheet 10 makes it IC sheet equipment 1 on both sides of the IC chip 2 at the shape of sandwiches between the sheets 10 of two sheets. Moreover, as for the case of paper or a nonwoven fabric, a sheet 10 constitutes \*\*\*\*\* IC sheet equipment 1 for composition fiber and the IC chip 2 together.

[0016] Drawing 2 is the functional block diagram of the IC chip 2. By showing an antenna coil, 21 receives the information from the reader writer 3, and sends it to the IC circuit 20 by this antenna coil 21, and transmits the information on the IC circuit 20 to the reader writer 3.

[0017] Drawing 3 is the functional block diagram of the reader writer 3. 31 is an antenna coil, this antenna coil 31 carries out proximity opposite with the antenna coil 21 of the aforementioned IC chip 2, and it receives the information from the IC chip 2, and sends it to the transceiver circuit 32, and transmits the information from the reader writer 3 to the IC chip 2. 33 is the interface circuitry which has a control function, and is connected to high order models, such as a computer.

[0018] Drawing 4 is the perspective diagram showing the 1st operation gestalt of the reader writer 3. A guide rail 34 is formed in the reader writer 3, the corner (corner of IC sheet equipment 1) of a sheet 10 is inserted, and alignment is carried out. The antenna coil 31 is formed inside the guide rail 34.

[0019] If the corner of a sheet 10 is inserted proper into a guide rail 34, the antenna coil 21 of a sheet 10 and the antenna coils 31 of the reader writer 3 will overlap, and magnetic coupling of both the antennas 21 and 31 will be carried out most strongly. The transceiver circuit 32 and interface-circuitry 33 grade can be suitably attached on the reader writer 3, and the displays 35 which indicate that it will transmit and receive if still more nearly required, such as a lamp, can also be formed.

[0020] Drawing 5 and drawing 6 are drawings showing the example of structure of the antenna coil 21 linked to the IC circuit 20. In the example shown in drawing 5, the comparatively large-sized antenna coil 21 and the IC circuit 20 are separately attached on a base material 22, and it connects with \*\*. An antenna coil 21 is taken as a triangle, as are shown in this drawing (a) and it is shown in a square or this drawing (b) according to the configuration of the base material 22 of the IC chip 2 of the corner of a sheet 10. Since it is easy to obtain a large-sized coil with printed circuit technology etc., it is easy to raise antenna sensitivity.

[0021] Drawing 6 is a perspective diagram at the time of turning on chip on the IC circuit 20 about an antenna coil 21. On-chip-ization can raise the reliability of connection between an antenna coil 21 and the IC circuit 20.

[0022] Drawing 7 (a), (b), and (c) are the plans of other operation forms of IC sheet equipment by this invention. IC sheet equipment 1 as shown in drawing 7 besides IC sheet equipment 1 shown in drawing 1 can be considered. Three IC chips 2a, 2b, and 2c are embedded in Misumi of a sheet 10, and IC sheet equipment 1 consists of drawing 7 (a). It is the composition that it was suitable when the sheet 10 of one sheet was shared by three persons.

[0023] The IC chip 2 is embedded in one corner of the triangular sheet 10, and IC sheet equipment 1 consists of drawing 7 (b). It is possible to embed the IC chip 2 at other two places if needed. It is in the round sheet 10, and drawing 7 (c) is cut, it embeds the IC chip 2 on the near periphery of the positioning section 11 (equivalent to the corner of a sheet) lacked and formed, and constitutes IC sheet equipment 1. [0024] Drawing 8 is a perspective diagram at the time of spelling the sheet 10 (IC sheet equipment 1) of two or more sheets like a book and a notebook. Although the sheet 10 which embedded the IC chip 2 is used for a page with the need of managing, you may use the sheet 10 which embedded the IC chip 2 to all pages.

[0025] Although the IC chip 2 of each page can be accessed by the reader writer 3 of the form shown in drawing 1, some pages before and behind a desired page are in an obstacle also with a bird clapper. In such a case, the clipped type reader writer 3 as shown in drawing 9 is excellent. Drawing 9 (a) - (d) is drawing showing the example of structure of the 2nd operation form of the reader writer 3. The reader writer 3 of this operation form is constituted from \*\*\*\*\* 36 by the claw part 37 of two sheets combined possible [ opening and closing ].

[0026] As shown in - (d), a sheet 10 (IC sheet equipment 1) is put between the claw parts 37 of two sheets, and between this (drawing a) the antenna coils 31 of the reader writer 3 and the antenna coils 21 prepared in the IC chip 2 in a sheet 10 is combined. [0027] While it is made for a claw part 37 to open lightly by spring material and it is pushing lightly with the finger, access operation of the reader writer 3 can be performed. Moreover, it pushes lightly with a finger and you may make it fasten the claw part 37 of two sheets. Since such spring structure, bundle doubling structure, etc. are easily realizable with the usual technology, explanation is omitted. Drawing 9 (e) differs from what used the claw part [ like drawing 9 (a) - (d) ] 37 of two sheets whose clipped type reader writer 3 is also. Antenna-coil 31 linear the very thing has elasticity, as shown in drawing, are bent in the shape of a clip, and a sheet 10 (IC sheet equipment 1) is elastically put between antenna coils 31. Between the antenna coil 31 of the reader writer 3 and the antenna coil 21 prepared in the IC chip 2 in a sheet 10 is combined.

[0028] Drawing 10 (a) - (d) is the perspective diagram showing the example of structure of the 3rd operation form of the reader writer 3. The reader writer 3 of this operation form is lightly pressed down with a finger, without putting a sheet 10 (IC sheet equipment 1), and combines between both the antenna coils 21 and 31. A height 39 is formed on the base material 38 of each reader writer 3 of this drawing, the corner of a sheet 10 is dashed against this height 39, and alignment is carried out.

[0029] The height 39 of drawing 10 (a) is L typeface. As for the height 39 of drawing 10 (b), plurality is prepared independently. The heights 39 of drawing 10 (c) are two rectangular parallelepipeds. The height 39 of drawing 10 (d) is the continuous cylindrical thing, and the corner inclines.

[0030] Since the corner of a sheet 10 is equivalent to a height 39 in the case of the height 39 of drawing 10 (b) and drawing 10 (c), damage on a corner can be prevented. In order that the height 39 of drawing 10 (d) may prevent damage, it corresponds to the sheet 10 which made the corner the taper, and the corner of a height 39 also inclines according to a taper-like corner.

[0031] [Effect of the Invention] The convenience of a non-contact sheet-like information media improves by this invention. That is, the alignment to a reader writer becomes easy by embedding IC chip at the corner of a sheet and constituting IC sheet equipment.

[0032] Moreover, combination between antennas can be raised by making the antenna coil of IC chip of IC sheet equipment into IC chip base material and a similarity configuration. Moreover, the sheet equipment of one sheet can be used by two or more persons by embedding IC chip at two or more corners (for example, Misumi or four corners) of a sheet. Moreover, management of IC sheet equipment, storage, etc. can be easy-sized by filing two or more IC sheet equipments.

[0033] Furthermore, alignment of IC sheet equipment can be made easy by the guide rail and height which were prepared in the reader writer. Moreover, the handling nature of a reader writer can be raised by making a reader writer into clip structure.

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TECHNICAL FIELD

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PRIOR ART

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[Description of the Prior Art] At the IC card which is a typical non-contact information media, by radio with a reader writer, the information from the informational writing and informational memory to memory is read, and, recently, progress of this noncontact IC card is extending a use remarkably.

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**EFFECT OF THE INVENTION**

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**TECHNICAL PROBLEM**

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**[Problem(s) to be Solved by the Invention]** It is very easy to embed IC chip of a non-contact information media into sheets, such as paper, cloth, and plastics, for the purpose of forged prevention, such as an authorization document, in view of the present paper manufacture technology.

[0004] However, there is a problem that it is difficult for a sheet to carry out alignment of eye a flexible hatchet and the IC chip of a sheet to the position of a reader writer simply correctly, the top where it is unclear where [ in a sheet ] IC chip was embedded, and, for this reason, IC sheet equipment was not taken up as one of the applicable fields of a non-contact information media.

[0005] The purpose of this invention is to offer IC sheet equipment which made easy alignment of IC chip to a reader writer, and its reader writer.

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## MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the 1st means is characterized by embedding IC chip at the predetermined corner of a sheet in IC sheet equipment which embedded IC chip which is the non-contact information media to which writing of the information on memory and read-out of the information from memory are performed by radio with a reader writer in sheets, such as paper, cloth, and plastics.

[0007] Moreover, the 2nd means is characterized by making the antenna-coil configuration of IC chip into a form [ \*\*\*\* / the base material of IC chip ] in IC sheet equipment of the 1st means of the above.

[0008] Moreover, the 3rd means is characterized by embedding two or more IC chips at two or more corners of a sheet, respectively in IC sheet equipment of the 1st means of the above.

[0009] Moreover, the 4th means is characterized by having filed two or more sheets which embedded IC chip, and making it the shape of books in IC sheet equipment of the 1st means of the above.

[0010] Moreover, the 5th means is characterized by preparing the slot to which it shows the corner of IC sheet equipment of the 1st means of the above in the reader writer which reads information from IC chip which is a non-contact information media, or writes information in IC chip.

[0011] Moreover, the 6th means is characterized by preparing the height to which it shows the corner of IC sheet equipment of the 1st means of the above in the reader writer which reads information from IC chip which is a non-contact information media, or writes information in IC chip.

[0012] Moreover, the 7th means is characterized by preparing the clip-like section which puts the corner of IC sheet equipment of the 1st means of the above in the reader writer which reads information from IC chip which is a non-contact information media, or writes information in IC chip.

[0013]

[Embodiments of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing. Drawing 1 is the plan showing IC sheet equipment concerning the gestalt of operation of this invention, and a reader writer. In this drawing, the sheet 10 of the square of flexible paper etc. is an authorization document like negotiable securities etc., and the IC chip 2 is embedded at the predetermined corner (in the case of this operation gestalt, it sees from the table of a sheet 10 and is a lower left corner), and it constitutes IC sheet equipment 1. The corner of IC sheet equipment 1 with which the IC chip 2 was embedded is inserted in the reader writer 3.

[0014] The thickness of the IC chip 2 is an about about 50-150-micrometer ultra-thin thing, and the embedding to the sheet 10 with a thickness of about 0.2-0.3mm is possible for it. As mentioned above, an authorization document etc. is for forged prevention, and that the IC chip 2 is embedded can distinguish no longer the purpose which embeds this IC chip 2 on a sheet 10 from appearance. The various information (for example, peculiar identification information given to the sheet 10 concerned, history information on a sheet 10, etc.) about the sheet 10 concerned is memorized by the IC chip 2.

[0015] At the time of textile fabrics or a sheet plastic (film), a sheet 10 makes it IC sheet equipment 1 on both sides of the IC chip 2 at the shape of sandwiches between the sheets 10 of two sheets. Moreover, as for the case of paper or a nonwoven fabric, a sheet 10 constitutes \*\*\*\* IC sheet equipment 1 for composition fiber and the IC chip 2 together.

[0016] Drawing 2 is the functional block diagram of the IC chip 2. By showing an antenna coil, 21 receives the information from the reader writer 3, and sends it to the IC circuit 20 by this antenna coil 21, and transmits the information on the IC circuit 20 to the reader writer 3.

[0017] Drawing 3 is the functional block diagram of the reader writer 3. 31 is an antenna coil, this antenna coil 31 carries out contiguity opposite with the antenna coil 21 of the aforementioned IC chip 2, and it receives the information from the IC chip 2, and sends it to the transceiver circuit 32, and transmits the information from the reader writer 3 to the IC chip 2. 33 is the interface circuitry which has a control function, and is connected to high order models, such as a computer.

[0018] Drawing 4 is the perspective diagram showing the 1st operation gestalt of the reader writer 3. A guide rail 34 is formed in the reader writer 3, the corner (corner of IC sheet equipment 1) of a sheet 10 is inserted, and alignment is carried out. The antenna coil 31 is formed inside the guide rail 34.

[0019] If the corner of a sheet 10 is inserted proper into a guide rail 34, the antenna coil 21 of a sheet 10 and the antenna coils 31 of the reader writer 3 will overlap, and magnetic coupling of both the antennas 21 and 31 will be carried out most strongly. The transceiver circuit 32 and interface-circuitry 33 grade can be suitably attached on the reader writer 3, and the displays 35 which indicate that it will transmit and receive if still more nearly required, such as a lamp, can also be formed.

[0020] Drawing 5 and drawing 6 are drawings showing the example of structure of the antenna coil 21 linked to the IC circuit 20. In the example shown in drawing 5, the comparatively large-sized antenna coil 21 and the IC circuit 20 are separately attached on a base material 22, and it connects with \*\*. An antenna coil 21 is taken as a triangle, as are shown in this drawing (a) and it is shown in a square or this drawing (b) according to the configuration of the base material 22 of the IC chip 2 of the corner of a sheet 10. Since it is easy to obtain a large-sized coil with printed circuit technology etc., it is easy to raise antenna sensitivity.

[0021] Drawing 6 is a perspective diagram at the time of turning on chip on the IC circuit 20 about an antenna coil 21. On-chip-ization can raise the reliability of connection between an antenna coil 21 and the IC circuit 20.

[0022] Drawing 7 (a), (b), and (c) are the plans of other operation gestalten of IC sheet equipment by this invention. IC sheet equipment 1 as shown in drawing 7 besides IC sheet equipment 1 shown in drawing 1 can be considered. Three IC chips 2a, 2b, and 2c are embedded in Misumi of a sheet 10, and IC sheet equipment 1 consists of drawing 7 (a). It is the composition that it was suitable when the sheet 10 of one sheet was shared by three persons.

[0023] The IC chip 2 is embedded in one corner of the triangular sheet 10, and IC sheet equipment 1 consists of drawing 7 (b). It is possible to embed the IC chip 2 at other two places if needed. It is in the round sheet 10, and drawing 7 (c) is cut, it embeds the IC chip 2 on the near periphery of the positioning section 11 (equivalent to the corner of a sheet) lacked and formed, and constitutes IC sheet equipment 1.

[0024] Drawing 8 is a perspective diagram at the time of spelling the sheet 10 (IC sheet equipment 1) of two or more sheets like a book and a notebook. Although the sheet 10 which embedded the IC chip 2 is used for a page with the need of managing, you may use the sheet 10 which embedded the IC chip 2 to all pages.

[0025] Although the IC chip 2 of each page can be accessed by the reader writer 3 of the form shown in drawing 1, some pages before and behind a desired page are in an obstacle also with a bird clapper. In such a case, the clipped type reader writer 3 as shown in drawing 9 is excellent. Drawing 9 (a) - (d) is drawing showing the example of structure of the 2nd operation gestalt of the reader writer 3. The reader writer 3 of this operation gestalt is constituted from \*\*\*\*\* 36 by the claw part 37 of two sheets combined possible [ opening and closing ].

[0026] As shown in - (d), a sheet 10 (IC sheet equipment 1) is put between the claw parts 37 of two sheets, and between this (drawing a) the antenna coils 31 of the reader writer 3 and the antenna coils 21 prepared in the IC chip 2 in a sheet 10 is combined.

[0027] While it is made for a claw part 37 to open lightly by spring material and it is pushing lightly with the finger, access operation of the reader writer 3 can be performed. Moreover, it pushes lightly with a finger and you may make it fasten the claw part 37 of two sheets. Since such spring structure,

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[0028] Drawing 10 (a) - (d) is the perspective diagram showing the example of structure of the 3rd operation gestalt of the reader writer 3. The reader writer 3 of this operation gestalt is lightly pressed down with a finger, without putting a sheet 10 (IC sheet equipment 1), and combines between both the antenna coils 21 and 31. A height 39 is formed on the base material 38 of each reader writer 3 of this drawing, the corner of a sheet 10 is dashed against this height 39, and alignment is carried out.

[0029] The height 39 of drawing 10 (a) is L typeface. As for the height 39 of drawing 10 (b), plurality is prepared independently. The heights 39 of drawing 10 (c) are two rectangular parallelepipeds. The height 39 of drawing 10 (d) is the continuous cylindrical thing, and the corner inclines.

[0030] Since the corner of a sheet 10 is equivalent to a height 39 in the case of the height 39 of drawing 10 (b) and drawing 10 (c), the injury on a corner can be prevented. In order that the height 39 of drawing 10 (d) may prevent an injury, it corresponds to the sheet 10 which made the corner the taper, and the corner of a height 39 also inclines according to a taper-like corner.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] It is the plan showing IC sheet equipment concerning the gestalt of operation of this invention, and a reader writer.

[Drawing 2] It is the functional block diagram of IC chip.

[Drawing 3] It is the functional block diagram of a reader writer.

[Drawing 4] It is the perspective diagram showing the example of structure of the 1st operation gestalt of a reader writer.

[Drawing 5] It is the plan of IC chip at the time of attaching an antenna coil and IC circuit separately on a base material.

[Drawing 6] It is the perspective diagram of IC chip which turned on chip on IC circuit about an antenna coil.

[Drawing 7] It is the plan showing each operation gestalt of IC sheet equipment of this invention.

[Drawing 8] It is a perspective diagram at the time of spelling two or more IC sheet equipments of this invention.

[Drawing 9] It is drawing showing the example of structure of the 2nd operation gestalt of a reader writer.

[Drawing 10] It is the perspective diagram showing the example of structure of the 3rd operation gestalt of a reader writer.

**[Description of Notations]**

1 IC Sheet Equipment

2 IC Chip

3 Reader Writer

10 Sheet

11 Positioning Section

20 IC Circuit

21 Antenna Coil

22 Base Material

31 Antenna Coil

32 Transceiver Circuit

33 Control and Interface Circuitry

34 Guide Rail

35 Display

36 \*\*\*\*\*

37 Claw Part

38 Base Material

39 Height

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## \* NOTICES \*

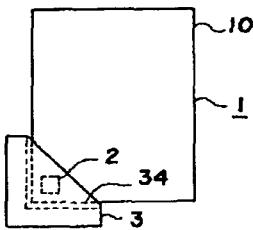
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## DRAWINGS

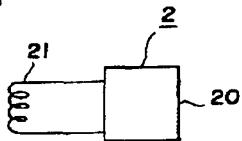
[Drawing 1]

[図 1]



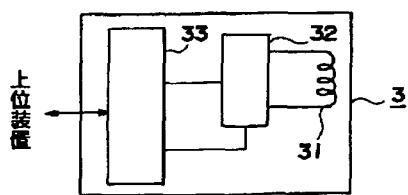
[Drawing 2]

[図 2]



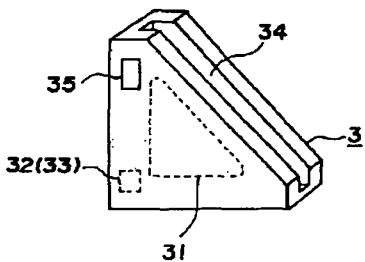
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[図 3]



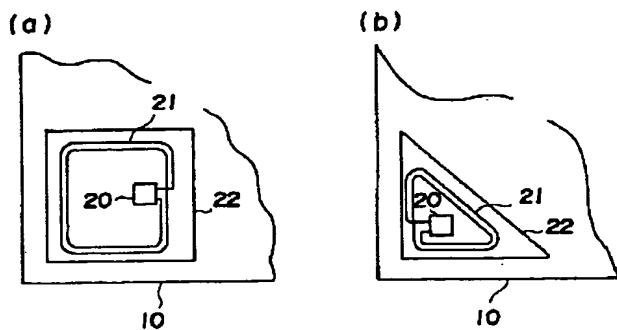
[Drawing 4]

[図 4]



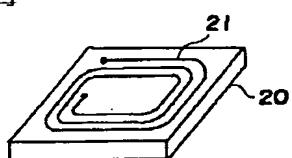
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## 【図 5】



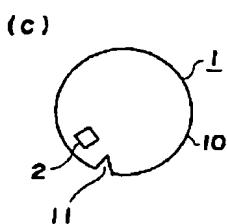
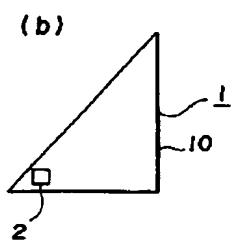
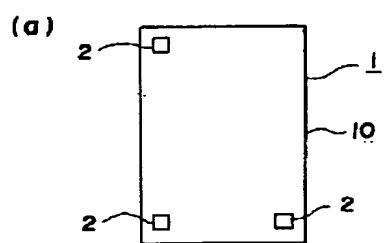
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## 【図 6】



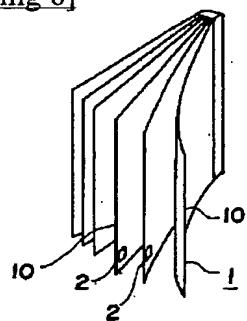
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## 【図 7】



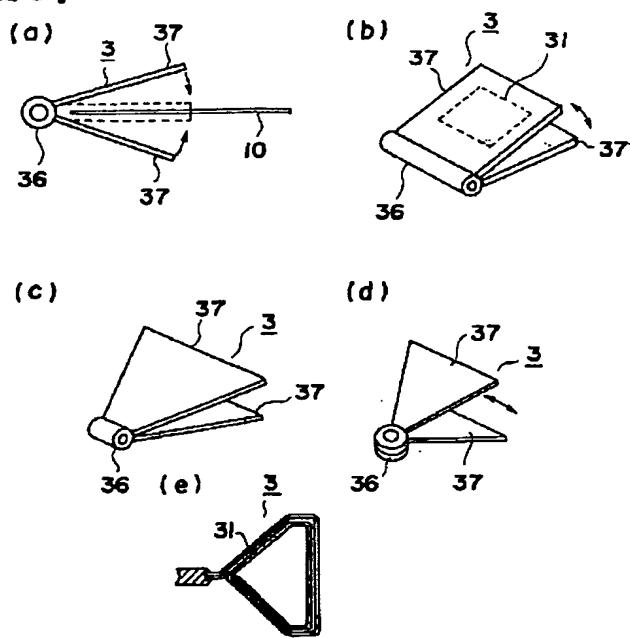
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## 【図 8】



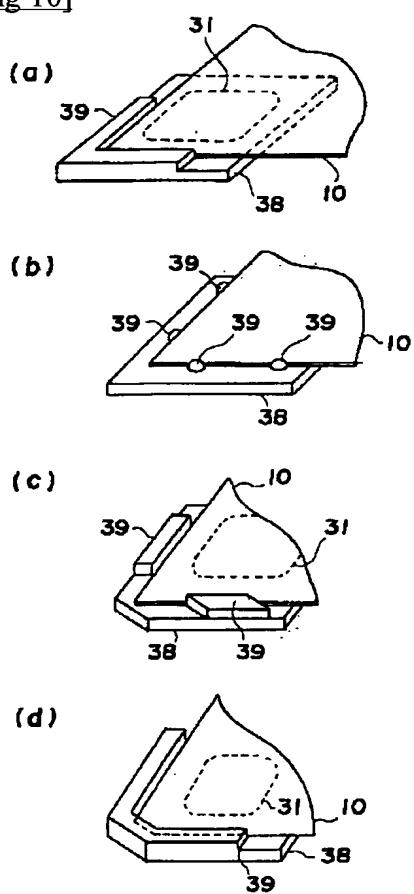
## [Drawing 9]

[図 9]



## [Drawing 10]

[図 10]



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[Translation done.]

(19)日本国特許庁 (JP)

(12) 公開特許公報 (A)

(11)特許出願公開番号

特開2001-148000

(P2001-148000A)

(43)公開日 平成13年5月29日 (2001.5.29)

(51)Int.Cl.<sup>7</sup>

G 0 6 K 19/077  
B 4 2 D 15/10  
G 0 6 K 17/00  
19/07  
19/00

識別記号

5 2 1

F I

B 4 2 D 15/10  
G 0 6 K 17/00  
19/00

5 2 1 2 C 0 0 5  
F 5 B 0 3 5  
K 5 B 0 5 8  
H  
V

テマコード(参考)

審査請求 未請求 請求項の数 7 O L (全 6 頁)

(21)出願番号

特願平11-331630

(22)出願日

平成11年11月22日 (1999.11.22)

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Fターム(参考) 20005 MA02 MB10

5B035 AA00 BA07 BB09 BC00 CA23

5B058 CA17 KA02 KA04 KA24 YA20

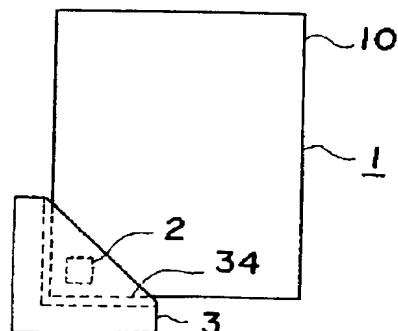
(54)【発明の名称】 ICシート装置並びにそれを用いるリーダライタ

(57)【要約】

【課題】 リーダライタに対するICチップの位置合わせを容易にしたICシート装置を提供する。

【解決手段】 リーダライタ3との無線通信によりメモリへの情報の書き込み及びメモリからの情報の読み出しが行われる非接触情報媒体であるICチップ2を、紙、布、プラスチック等のシート10内に埋め込んだICシート装置において、ICチップ2をシート10の角部に埋め込むようにしてリーダライタ3に対するICチップ2の位置合わせを容易にする。

【図1】



## 【特許請求の範囲】

【請求項1】 リーダライタとの無線通信によりメモリへの情報の書き込み及びメモリからの情報の読み出しが行われるICチップをシートに埋め込んだICシート装置において、前記ICチップをシートの所定の角部に埋め込んだことを特徴とするICシート装置。

【請求項2】 請求項1記載のICシート装置において、前記ICチップのアンテナコイル形状をICチップの基材と相似な形にしたことを特徴とするICシート装置。

【請求項3】 請求項1記載のICシート装置において、複数のICチップを前記シートの複数の角部にそれぞれ埋め込んだことを特徴とするICシート装置。

【請求項4】 請求項1記載のICシート装置において、前記ICチップを埋め込んだシートを複数枚綴じ合わせたことを特徴とするICシート装置。

【請求項5】 非接触情報媒体であるICチップから情報を読み出し、あるいはICチップに情報を書き込むリーダライタにおいて、前記請求項1記載のICシート装置の角部を案内する溝を設けたことを特徴とするリーダライタ。

【請求項6】 非接触情報媒体であるICチップから情報を読み出し、あるいはICチップに情報を書き込むリーダライタにおいて、前記請求項1記載のICシート装置の角部を案内する突起部を設けたことを特徴とするリーダライタ。

【請求項7】 非接触情報媒体であるICチップから情報を読み出し、あるいはICチップに情報を書き込むリーダライタにおいて、前記請求項1記載のICシート装置の角部を挟み込むクリップ状部を設けたことを特徴とするリーダライタ。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、リーダライタとの無線通信によりメモリへの情報の書き込み及びメモリからの情報の読み出しが行われる薄いICチップをシートに埋め込んだICシート装置並びにそれを用いるリーダライタに関する。

## 【0002】

【従来の技術】 代表的な非接触情報媒体であるICカードでは、リーダライタとの無線通信により、メモリへの情報の書き込み及びメモリからの情報の読み出しを行っており、最近ではこの非接触型ICカードの進歩が著しく用途を広げつつある。

## 【0003】

【発明が解決しようとする課題】 非接触情報媒体のICチップを、認定書などの偽造防止の目的のために、紙、布、プラスチック等のシートの中に埋め込むことは現在の製紙技術からみて極めて容易なことである。

## 【0004】 しかし、ICチップがシート内の何処に埋

め込まれたかが判りにくい上、シートがフレキシブルなため、シートのICチップをリーダライタの所定の位置に正しく簡単に位置合わせすることが困難という問題があり、このためICシート装置は、非接触情報媒体の応用分野の1つとしては取り上げられていなかった。

【0005】 本発明の目的は、リーダライタに対するICチップの位置合わせを容易にしたICシート装置とそのリーダライタを提供することにある。

## 【0006】

10 【課題を解決するための手段】 上記目的を達成するため、第1の手段は、リーダライタとの無線通信によりメモリへの情報の書き込み及びメモリからの情報の読み出しが行われる非接触情報媒体であるICチップを、紙、布、プラスチック等のシート内に埋め込んだICシート装置において、ICチップをシートの所定の角部に埋め込んだことを特徴とするものである。

【0007】 また第2の手段は、前記第1の手段のICシート装置において、ICチップのアンテナコイル形状をICチップの基材と相似な形にしたことを特徴とするものである。

20 【0008】 また第3の手段は、前記第1の手段のICシート装置において、複数のICチップをシートの複数の角部にそれぞれ埋め込んだことを特徴とするものである。

【0009】 また第4の手段は、前記第1の手段のICシート装置において、ICチップを埋め込んだシートを複数枚綴じ合わせて書籍状にしたことを特徴とするものである。

30 【0010】 また第5の手段は、非接触情報媒体であるICチップから情報を読み出し、あるいはICチップに情報を書き込むリーダライタにおいて、前記第1の手段のICシート装置の角部を案内する溝を設けたことを特徴とするものである。

【0011】 また第6の手段は、非接触情報媒体であるICチップから情報を読み出し、あるいはICチップに情報を書き込むリーダライタにおいて、前記第1の手段のICシート装置の角部を案内する突起部を設けたことを特徴とするものである。

40 【0012】 また第7の手段は、非接触情報媒体であるICチップから情報を読み出し、あるいはICチップに情報を書き込むリーダライタにおいて、前記第1の手段のICシート装置の角部を挟み込むクリップ状部を設けたことを特徴とするものである。

## 【0013】

【発明の実施の形態】 以下、本発明の実施の形態を図面に基づいて説明する。図1は本発明の実施の形態に係るICシート装置とリーダライタを示す平面図である。同図において、フレキシブルな紙等の四角形のシート10は例えば有価証券の如き認定書などで、その所定の角部(本実施形態の場合はシート10の表から見て左下の角

部)にICチップ2が埋め込まれてICシート装置1を構成している。ICチップ2が埋め込まれたICシート装置1の角部が、リーダライタ3に差し込まれている。

【0014】ICチップ2の厚さは約50～150μm程度の極薄のもので、厚さ0.2～0.3mm程度のシート10への埋め込みが可能である。このICチップ2をシート10に埋め込む目的は上述したように認定書などの偽造防止のためであり、ICチップ2が埋め込まれていることが外観からは判別できないようになっている。ICチップ2に、当該シート10に関する各種情報(例えば当該シート10に付された固有の識別情報、シート10の履歴情報など)が記憶されている。

【0015】シート10が織布やプラスチックシート(フィルム)のときは、2枚のシート10の間にICチップ2をサンドイッチ状に挟んでICシート装置1とする。また、シート10が紙や不織布の場合は、構成繊維とICチップ2と一緒に梳いてICシート装置1を構成する。

【0016】図2は、ICチップ2の機能ブロック図である。21はアンテナコイルを示し、このアンテナコイル21により、リーダライタ3からの情報を受信してIC回路20に送り、また、IC回路20の情報をリーダライタ3に送信する。

【0017】図3は、リーダライタ3の機能ブロック図である。31はアンテナコイルで、このアンテナコイル31が前記ICチップ2のアンテナコイル21と近接対向して、ICチップ2からの情報を受信して送受信回路32に送り、また、リーダライタ3からの情報をICチップ2に送信する。33は制御機能を有するインターフェイス回路で、コンピュータ等の上位機種に接続されている。

【0018】図4は、リーダライタ3の第1の実施形態を示す斜視図である。リーダライタ3に案内溝34を設け、シート10の角部(ICシート装置1の角部)を挿入して位置合わせをする。案内溝34の内側に、アンテナコイル31が設けられている。

【0019】シート10の角部が案内溝34内に適正に挿入されれば、シート10のアンテナコイル21とリーダライタ3のアンテナコイル31が重なり合って、両アンテナ21、31は最も強く磁気結合する。送受信回路32やインターフェイス回路33等はリーダライタ3上に適宜取り付け、さらに必要ならば送受信を行なっていることを表示する例えばランプなどの表示部35を設けることもできる。

【0020】図5、図6はIC回路20に接続するアンテナコイル21の構造例を示す図である。図5に示す例では、比較的大型のアンテナコイル21とIC回路20とを基材22上に別個に取り付けて互に接続する。アンテナコイル21は、シート10の角部のICチップ2の基材22の形状に合わせて、同図(a)に示すように四

角形、あるいは同図(b)に示すように三角形とする。印刷回路技術等により大型コイルが得やすいので、アンテナ感度を高めることができる。

【0021】図6は、アンテナコイル21をIC回路20上にオンチップ化した場合の斜視図である。オンチップ化により、アンテナコイル21とIC回路20間の接続の信頼性を高めることができる。

【0022】図7(a)、(b)、(c)は本発明によるICシート装置の他の実施形態の平面図である。図110に示すICシート装置1以外にも図7に示すようなICシート装置1が考えられる。図7(a)では、3つのICチップ2a、2b、2cをシート10の三隅に埋め込んでICシート装置1を構成している。1枚のシート10を3人で共用する場合などに適した構成である。

【0023】図7(b)では、三角形のシート10の一角にICチップ2を埋め込んでICシート装置1を構成している。必要に応じてICチップ2を他の2箇所にも埋め込むことが可能である。図7(c)は丸形のシート10にあって、切り欠いて形成した位置決め部11(シートの角部に相当)の近傍外周にICチップ2を埋め込んでICシート装置1を構成している。

【0024】図8は、複数枚のシート10(ICシート装置1)を本、ノートのように綴り込んだ場合の斜視図である。管理する必要のある頁にはICチップ2を埋め込んだシート10を用いるが、全頁にICチップ2を埋め込んだシート10を用いてもよい。

【0025】図1に示した形のリーダライタ3により各頁のICチップ2をアクセスすることが出来るが、所望の頁の前後の頁が多少邪魔になることもある。このような場合には、図9に示すようなクリップ型のリーダライタ3が優れている。図9(a)～(d)はリーダライタ3の第2の実施形態の構造例を示す図である。この実施形態のリーダライタ3は、ひんじ部36にて開閉可能に結合された2枚の爪部37により構成される。

【0026】同図(a)～(d)に示すように、2枚の爪部37の間にシート10(ICシート装置1)を挟み込んで、リーダライタ3のアンテナコイル31と、シート10内のICチップ2に設けられたアンテナコイル21間とを結合させる。

【0027】爪部37がバネ材により軽く開くようにし、指で軽く押している間にリーダライタ3のアクセス動作を行うようにすることができる。また、指で軽く押して2枚の爪部37を締め合わせるようにしてよい。このようなバネ構造や締め合わせ構造等は通常の技術により容易に実現できるので説明は省略する。図9(e)はクリップ型のリーダライタ3でも図9(a)～(d)のような2枚の爪部37を用いたものとは異なり、線状のアンテナコイル31自体が弾性を有し、図に示すようにクリップ状に折り曲げられて、アンテナコイル31の間にシート10(ICシート装置1)を弾性的に挟み込

んで、リーダライタ3のアンテナコイル31と、シート10内のICチップ2に設けられたアンテナコイル21間とを結合させる。

【0028】図10(a)～(d)は、リーダライタ3の第3の実施形態の構造例を示す斜視図である。本実施形態のリーダライタ3は、シート10(ICシート装置1)を挟み込まずに指で軽く押さえて、両アンテナコイル21、31間を結合させるものである。同図の各リーダライタ3の基材38上に突起部39を設け、シート10の角部をこの突起部39に突き当てて位置合わせをする。

【0029】図10(a)の突起部39はL字形である。図10(b)の突起部39は独立して複数個が設けてある。図10(c)の突起部39は2つの直方体である。図10(d)の突起部39は連続した棒状のもので、角部が傾斜している。

【0030】図10(b)、図10(c)の突起部39の場合、シート10の角部が突起部39に当たらないようになっているため、角部の損傷を防止することができる。図10(d)の突起部39は損傷を防止するため、角部をテーパにしたシート10に対応するものであり、テーパ状の角部に合わせて突起部39の角部も傾斜している。

### 【0031】

【発明の効果】本発明によりシート状の非接触情報媒体の利便性が向上する。即ち、ICチップをシートの角部に埋め込んでICシート装置を構成することにより、リーダライタに対する位置合わせが容易になる。

【0032】また、ICシート装置のICチップのアンテナコイルをICチップ基材と相似形状にすることにより、アンテナ間の結合を高めることができる。また、シートの複数の角部(例えば三隅あるいは四隅)にICチップを埋め込むことにより、1枚のシート装置を複数人で利用することができる。また、複数のICシート装置を綴じ合わせることにより、ICシート装置の管理、保管等を容易化することができる。

【0033】さらに、リーダライタに設けた案内溝や突起部により、ICシート装置の位置合わせを容易にすることができる。また、リーダライタをクリップ構造とす

ることにより、リーダライタの取り扱い性を向上させることができる。

### 【図面の簡単な説明】

【図1】本発明の実施の形態に係るICシート装置とリーダライタを示す平面図である。

【図2】ICチップの機能ブロック図である。

【図3】リーダライタの機能ブロック図である。

【図4】リーダライタの第1の実施形態の構造例を示す斜視図である。

10 【図5】アンテナコイルとIC回路とを基材上に別個に取り付けた場合のICチップの平面図である。

【図6】アンテナコイルをIC回路上にオンチップ化したICチップの斜視図である。

【図7】本発明のICシート装置の各実施形態を示す平面図である。

【図8】本発明のICシート装置を複数枚綴り込んだ場合の斜視図である。

【図9】リーダライタの第2の実施形態の構造例を示す図である。

20 【図10】リーダライタの第3の実施形態の構造例を示す斜視図である。

### 【符号の説明】

1 ICシート装置

2 ICチップ

3 リーダライタ

10 シート

11 位置決め部

20 IC回路

21 アンテナコイル

30 22 基材

31 アンテナコイル

32 送受信回路

33 制御及びインターフェイス回路

34 案内溝

35 表示部

36 ひんじ部

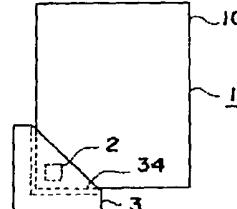
37 爪部

38 基材

39 突起部

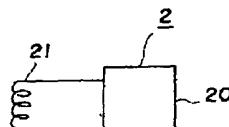
【図1】

【図1】



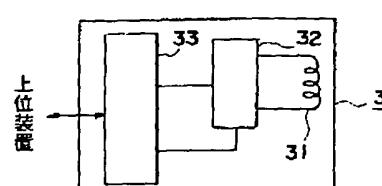
【図2】

【図2】



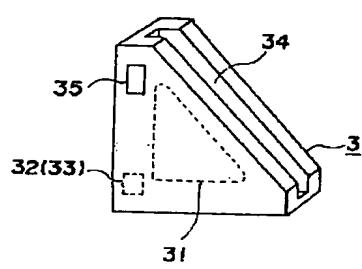
【図3】

【図3】



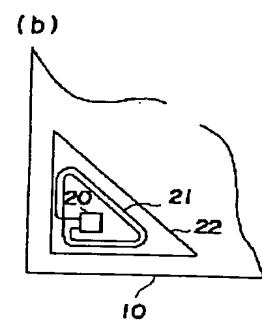
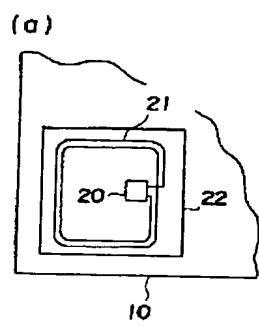
【図4】

【図4】



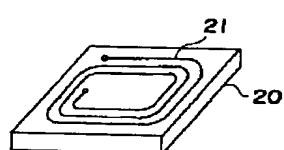
【図5】

【図5】



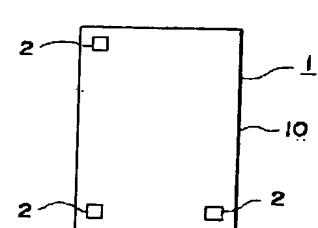
【図6】

【図6】



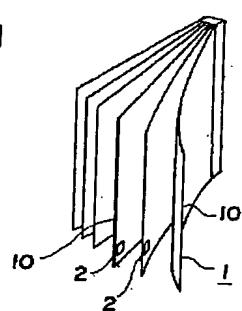
【図7】

【図7】

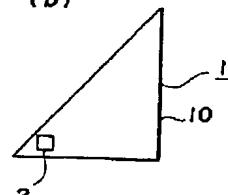


【図8】

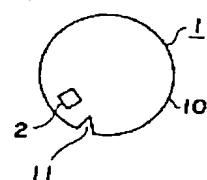
【図8】



(b)

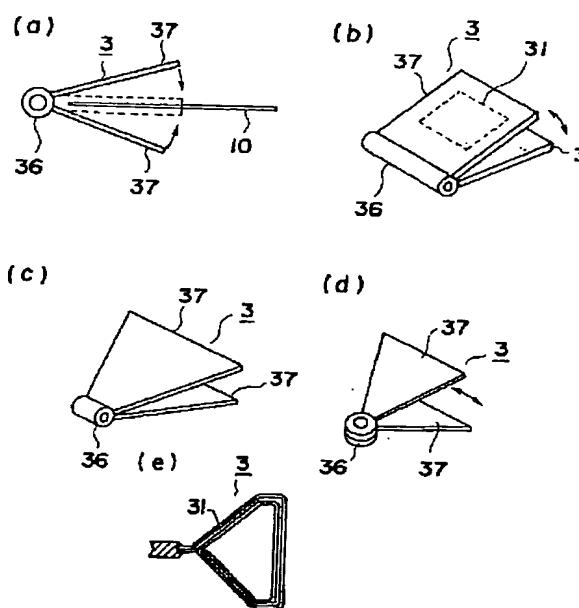


(c)



【図9】

【図9】



【図10】

【図10】

